

# Surgical treatment of coronary artery aneurysm with calcification and stenosis:a Case Report and Review of the Literature

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## Abstract

Coronary artery aneurysm (CAA) has been increasingly reported in recent years. The symptoms are related to myocardial ischemia, such as angina pectoris, myocardial infarction, sudden death and congestive heart failure. This report describes a case of a giant CAA with calcification and stenosis involving two coronary arteries, and the patient underwent a complete arterialized coronary artery bypass graft successfully. In this report, all cases related to CAA with calcification and stenosis are summarized. According to the data, the following conclusions can be drawn: CAA seem to be more common in men; Kawasaki disease is likely to be a causative factor in some patients with asymptomatic CAA involving calcification and stenosis; CABG is a feasible treatment option for CAA with calcification and stenosis.

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This study was in line with our institution's ethics guidelines and the patients gave consent.

## Abstract

Coronary artery aneurysm (CAA) has been increasingly reported in recent years. The symptoms are related to myocardial ischemia, such as angina pectoris, myocardial infarction, sudden death and congestive heart failure. This report describes a case of a giant CAA with calcification and stenosis involving two coronary arteries, and the patient underwent a complete arterialized coronary artery bypass graft successfully. In this report, all cases related to CAA with calcification and stenosis are summarized. According to the data, the following conclusions can be drawn: CAA seem to be more common in men; Kawasaki disease is likely to

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## Key words

Coronary artery aneurysm, surgical treatment, calcification and stenosis

## Introduction

Coronary artery aneurysm (CAA) is defined as the epicardial coronary artery exceeds 1.5-2 times the normal adjacent coronary artery<sup>[1, 2]</sup>, with the incidence is approximately 0.02-0.04%<sup>[1]</sup>. At present, the diagnostic criteria of CAA, especially giant CAA, is still inconclusive. And There is no consensus on the indications and methods of surgery for CAA. This report describes a case of CAA with calcification and stenosis and summarizes relevant cases since the first report.

## Case description

A 31-year-old female, with the symptom of dyspnea after exercise for 3 years. After being admitted to the hospital, coronary computed tomography angiography (CTA) revealed the formation of CAAs in the proximal left anterior descending artery and proximal right coronary artery with severe calcification, the dimensions were 2.5cm×1.6cm×2.0cm and 1.4cm×1.3cm×2.0cm respectively. (Figure 1). Coronary angiography showed the middle part of left anterior descending branch (LAD) was stenosis 90%, TIMI grade 1, 90% stenosis in the middle of RCA (Figure 2). The electrocardiography (ECG) showed normal sinus rhythm (Figure 3), and the outline of two coronary aneurysms can be seen on chest X-ray radiography (Figure 4). The echocardiogram showed LVED was 49mm, LA was 29mm, and the EF was 60%. The carotid artery CT showed that the lumen of the innominate artery. The carotid arteries, internal carotid arteries, external carotid arteries, bilateral subclavian arteries, and vertebral arteries were smoothly and without any narrowing by atheromatous plaque (Figure 2). The patient underwent coronary artery bypass graft. The left internal mammary artery and left radial artery were harvested, then bypass surgeries of the left internal mammary artery to LAD and the left radial artery to RCA were performed. Follow-up 3 months after discharge, the patient was uneventful.

## Discussion

A case with complete calcified coronary artery aneurysms involving both the right coronary artery and the left anterior descending artery is rare. Most coronary artery aneurysms involve only one artery, and less than 25% of cases involve multiple arteries<sup>[3, 4]</sup>. CAAs with an artery diameter greater than 20 mm or four times the normal reference artery diameter was defined as giant coronary artery aneurysms<sup>[5, 6]</sup>. In this case, the dimension of the CAA can reach 2.5cm×1.6cm×2.0cm, and 1.4cm×1.3cm×2.0cm respectively, which can be classified as a giant coronary artery aneurysm involving bilateral coronary artery. The most common cause of coronary artery aneurysms is atherosclerosis, and other causes including congenital heart disease, Kawasaki disease, Marfan syndrome, Ehlers-Danlos syndrome, Takayasu arteritis, nodular arteritis, and syphilitic aortitis, Scleroderma, systemic lupus erythematosus, Behçet's disease, fibromuscular dysplasia and iatrogenic injury<sup>[5, 7-9]</sup>. The patient did not have a history of atherosclerosis, connective tissue disease, or interventional therapy. To our knowledge, there are three reports that are very similar to the clinical evolution and imaging manifestations of this case<sup>[10-12]</sup>. The causes of CAA did not seem to be clear, and maybe relate to the ambiguous history of Kawasaki disease in childhood without standardized treatment. It has been reported that 5/22 of cases with Kawasaki disease occurred calcification during follow-up. In addition, the report also proposed that the diameter of the aneurysm in the case with calcification is larger than that in the case without calcification<sup>[13]</sup>. Kaichi and colleagues pointed out that the risk of CAA in the longterm calcification (20 years) was as high as 94% for patients with Kawasaki disease without symptoms but with a CAA > 6 mm<sup>[11]</sup>. Therefore, for patients without symptoms in childhood and with CAAs calcification in adulthood, are more likely to have Kawasaki disease in childhood, and this kind of disease can be used as a risk stratification factor for long-term sudden death in patients with Kawasaki disease<sup>[14]</sup>.

According to the literatures, most coronary aneurysms are asymptomatic, some patients suffered from angina, myocardial infarction, sudden death, congestive heart failure, etc<sup>[5, 15]</sup>. In addition, the majority gender of cases are male, which is similar to the aggregated data of Morita, Keyser, Ino and Li, and these data suggest that CAAs may be more common in male patients. [3, 4, 16, 17].

There are no an effective treatment for CAA, and further studies are needed to establish a guideline. Due to the risk of thrombosis associated with CAA, platelet inhibitors are used to prevent ischemic synthesis caused by fibrin thrombosis and microemboli, so antiplatelet and/or anticoagulation therapy were recommended [5, 18].

Surgical treatment was an option to avoid CAA rupture, dissection, myocardial ischemia and embolism<sup>[2, 19, 20]</sup>, although their specific surgical treatment standards have not yet reached consensus<sup>[1]</sup>. For CAAs, multiple surgical strategies have been reported, including reconstruction, resection or exclusion, as well as ligation combined with coronary artery bypass, patch, or hybrid repair<sup>[21-25]</sup>. Especially for patients with normal distal vessels, coronary artery bypass grafting is the preferred treatment<sup>[1, 2]</sup>. According to the summary of all cases with CAA calcification and stenosis<sup>[2, 10, 12, 13, 22, 26-38]</sup> (Table 1), surgical treatment based on CABG can effectively solve the problem of CAA calcification and stenosis. Unfortunately, all reports have no long-term follow-up results.

The long-term patency rate of internal mammary artery bypass for coronary aneurysms is much higher than that of great saphenous vein bypass ( $77.1\% \pm 1.1\%$  compared to  $46.2\% \pm 6.3\%$  for patency 85 months after operation)<sup>[1, 39]</sup>. There are few reports on the internal mammary artery + radial artery in treatment of stenotic and calcified CAA.

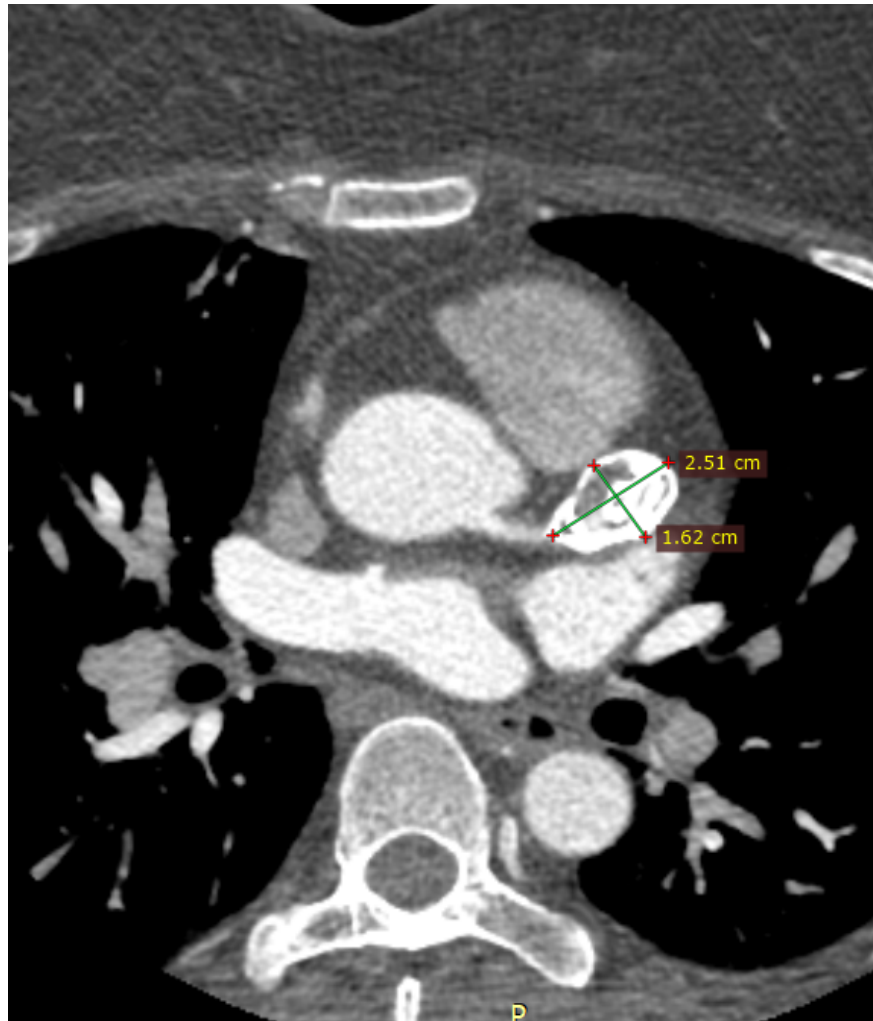
To summarize, we reported a case of a coronary artery aneurysm with calcification and stenosis involving two coronary arteries, and underwent a complete arterialized bypass operation, with a good result. By reviewing the literature, the morbidity of CAAs in male patients seem to be more higher than it in female patients. Kawasaki disease is likely to be a causative factor in some patients with asymptomatic CAA involving calcification and stenosis. And CABG is a feasible treatment option for coronary artery aneurysms with calcification and stenosis.

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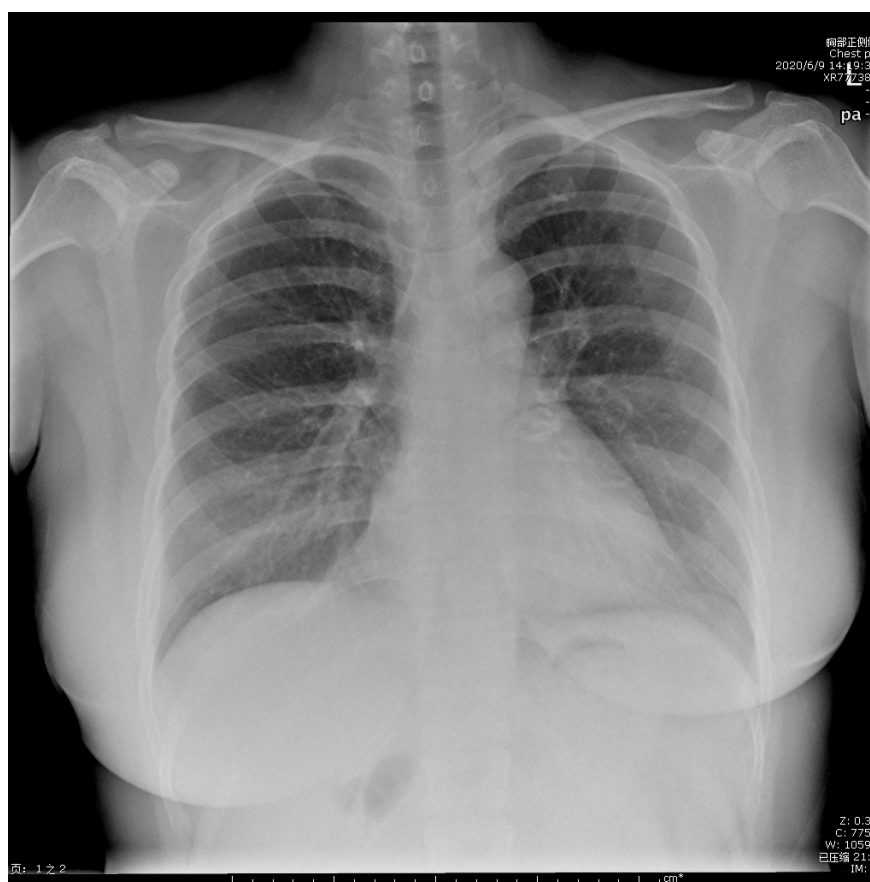
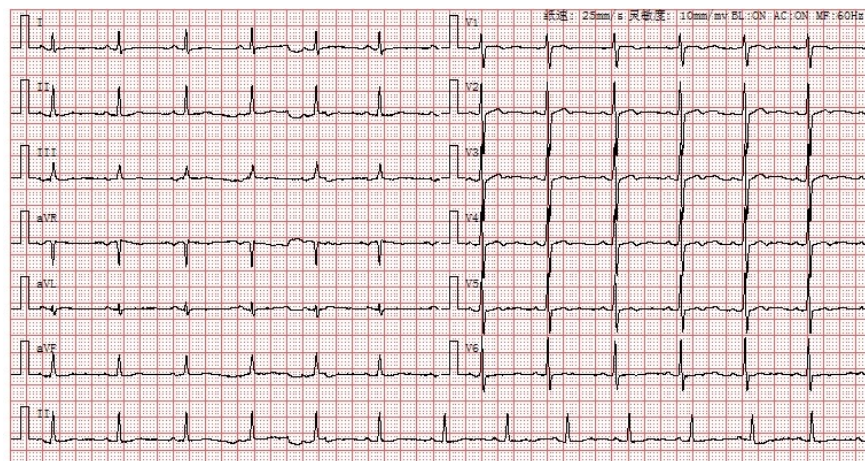
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